



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/940,642	08/29/2001	Shinichi Kawate	35.C15728	5606
5514	7590	11/30/2004	EXAMINER	
FITZPATRICK CELLA HARPER & SCINTO			PERRY, ANTHONY T	
30 ROCKEFELLER PLAZA			ART UNIT	
NEW YORK, NY 10112			PAPER NUMBER	
			2879	

DATE MAILED: 11/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/940,642

Applicant(s)

KAWATE ET AL.

Examiner

Anthony T Perry

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 August 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29, 31-37, 41, 43 and 57-61 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-15 is/are allowed.
- 6) ☒ Claim(s) 16-18, 20, 21, 29, 31, 32, 34, 35, 43, 57, 58 and 61 is/are rejected.
- 7) ☒ Claim(s) 19, 22-28, 33, 36, 37, 41, 59 and 60 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 August 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7/9/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Art Unit: 2879

DETAILED ACTION

Response to Amendment

The Amendment, filed on 09/02/04, has been entered and acknowledged by the Examiner.

Cancellation of claims 38-40, 42, and 44-56 has been entered.

Claims 57-61 have been added.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 16-18, 20-21, 29, 31-32, 34-35, 43, 57-58, and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maruo et al. (US 5,382,867) in view of Keesmann et al. (US 5,773,921).

Regarding claim 16, Maruo teaches an electron-emitting device comprising a first electrode (1) and a second electrode (2) placed in opposition to each other, with a gap (7) between the two electrodes, on a surface of the substrate (4) (see Fig. 2). The Maruo reference does not specifically teach the use of a plurality of carbon fibers electrically connected to the first electrode.

However, the Keesmann reference teaches connecting carbon nanotubes to the edges of cathodes (see for example col. 3, lines 9-15). Keesmann teaches that including such carbon

Art Unit: 2879

fibers assures high emission quality and produces a cathode that is highly resistant to bombardment of residual gas ions (see for example col. 3, lines 1-3).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have connected carbon fibers to the tips of the first electrode of the Maruo device in order to increase the electron emission efficiency and lifetime of the device.

Regarding claims 17-18, Keesmann teaches that the nanotubes may be of the single-shell type or multiple-shell type (see for example col. 3, lines 9-15). Single-shell nanotubes are made up of one cylindrical graphene while multiple-shell nanotubes are made up of multiple cylindrical graphenes.

Regarding claim 20, electrons are emitted from the device taught by Maruo by applying a voltage between the first and second electrode, wherein the potential of the second electrode is higher than that of the first.

Regarding claim 21, the height from the surface of the substrate to the first electrode (1) is larger than the height from the surface of the substrate to the surface of second electrode (2) of the electron-emitting device taught by Maruo (see Fig. 2). Since the carbon fibers are placed on the first electrode, the height from the surface of the substrate to the fibers is larger than the height from the surface of the substrate to the surface of second electrode of the combined invention.

Regarding claim 29, Maruo teaches an electron source comprising a plurality of electron emitting devices arrayed on a substrate (4) (see Fig. 1). Maruo teaches an electron-emitting device comprising a first electrode (1) and a second electrode (2) placed in opposition to each other, with a gap (7) between the two electrodes, on a surface of the substrate (4) (see Fig. 2).

Art Unit: 2879

The Maruo reference does not specifically teach the use of a plurality of carbon fibers electrically connected to the first electrode.

However, the Keesmann reference teaches connecting carbon nanotubes to the edges of cathodes (see for example col. 3, lines 9-15). Keesmann teaches that including such carbon fibers assures high emission quality and produces a cathode that is highly resistant to bombardment of residual gas ions (see for example col. 3, lines 1-3).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have connected carbon fibers to the tips of the first electrode of the Maruo device in order to increase the electron emission efficiency and lifetime of the device.

Regarding claims 31-32, Keesmann teaches that the nanotubes may be of the single-shell type or multiple-shell type (see for example col. 3, lines 9-15). Single-shell nanotubes are made up of one cylindrical graphene while multiple-shell nanotubes are made up of multiple cylindrical graphenes.

Regarding claim 34, electrons are emitted from the device taught by Maruo by applying a voltage between the first and second electrode, wherein the potential of the second electrode is higher than that of the first.

Regarding claim 35, the height from the surface of the substrate to the first electrode (1) is larger than the height from the surface of the substrate to the surface of second electrode (2) of the electron-emitting device taught by Maruo (see Fig. 2). Since the carbon fibers are placed on the first electrode, the height from the surface of the substrate to the fibers is larger than the height from the surface of the substrate to the surface of second electrode of the combined invention.

Regarding claim 43, Maruo teaches an electron-emitting device used as the discharge element for an image-forming apparatus which inherently comprises a fluorescent member. The image-forming member of such an image-forming apparatus for forming an image by collision of emitted electrons is inherently disposed at a position facing the electron source.

Regarding claim 57, Maruo teaches an electron-emitting device comprising a first electrode (1) and a second electrode (2) placed in opposition to each other, with a gap (7) between the two electrodes, on a surface of the substrate (4) (see Fig. 2). The Maruo reference does not specifically teach the use of a plurality of carbon fibers electrically connected to the first electrode.

However, the Keesmann reference teaches connecting carbon nanotubes to the edges of cathodes (see for example col. 3, lines 9-15). Keesmann teaches that including such carbon fibers assures high emission quality and produces a cathode that is highly resistant to bombardment of residual gas ions (see for example col. 3, lines 1-3).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have connected carbon fibers to the tips of the first electrode of the Maruo device in order to increase the electron emission efficiency and lifetime of the device.

The height from the surface of the substrate to the first electrode (1) is larger than the height from the surface of the substrate to the surface of second electrode (2) of the electron-emitting device taught by Maruo (see Fig. 2). Since the carbon fibers are placed on the first electrode, the height from the surface of the substrate to the fibers is larger than the height from the surface of the substrate to the surface of second electrode of the combined invention.

Regarding claim 58, the top surface of the second electrode (2) is substantially parallel to the surface of the substrate (4) (see Fig. 2).

Regarding claim 61, Maruo teaches the electron-emitting device used as the discharge element for an image-forming apparatus which inherently comprises a phosphor. The image-forming member of such an image-forming apparatus for forming an image by collision of emitted electrons is inherently disposed at a position facing the electron source.

Allowable Subject Matter

Claims 1-15 are allowed.

Claims 19, 22, 23-28, 33, 36-37, 41, and 59-60 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Prior art fails to disclose or fairly suggest:

- A fibrous carbon grown through a catalyst disposed on a sidewall surface of a layer of Ti oxide, Zr oxide, or Nb oxide formed on the first electrode, in combination with the remaining claimed limitations as called for in claims 1 and 13 (claims 2-12 and 14-15 would be allowable for the same reasons since they are dependent on claims 1 and 13 respectively);
- Each of the fibers comprise a plurality of graphenes which are stacked so as not to be parallel to the axis direction of each fiber, in combination with the remaining claimed limitations as called for in claims 19, 33, and 60;

Art Unit: 2879

- The thickness of the first electrode is larger than a thickness of the second electrode, in combination with the remaining claimed limitations as called for in claims 22 and 36;
- A first layer comprising a Ti oxide, a Zr oxide, or an Nb oxide placed between the first electrode and the fibers, in combination with the remaining claimed limitations as called for in claims 23 and 37 (claims 24-28 and 41 would be allowable for the same reasons since they are dependent on claims 23 and 37 respectively);
- The second electrode touching a surface of the substrate. Claim 59 states that the top surface of the second electrode is substantially parallel to an interface between the second electrode and the substrate. The phrase “interface between said second electrode and said substrate” requires that the second electrode touches a surface of the substrate.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to *Anthony Perry* whose telephone number is (571) 272-2459. The examiner can normally be reached between the hours of 9:00AM to 5:30PM Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel, can be reached on (571) 272-24597. **The fax phone number for this Group is (703) 872-9306.**

Art Unit: 2879

Communications via Internet e-mail regarding this application, other than those under 35 U.S.C. 132 or which otherwise require a signature, may be used by the applicant and should be addressed to [Anthony.perry@uspto.gov].

All Internet e-mail communications will be made of record in the application file. PTO employees do not engage in Internet communications where there exists a possibility that sensitive information could be identified or exchanged unless the record includes a properly signed express waiver of the confidentiality requirements of 35 U.S.C. 122. This is more clearly set forth in the Interim Internet Usage Policy published in the Official Gazette of the Patent and Trademark on February 25, 1997 at 1195 OG 89.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.



Anthony Perry
Patent Examiner
Art Unit 2879
November 29, 2004

Joseph Williams
Joseph Williams
for

Vip Patel
Primary Examiner
Art Unit 2879